Spring 5-2020

Evaluating Seafood Distribution Channels in the Atlantic Sea Scallop and Northeast Multispecies Groundfish Fisheries

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EVALUATING SEAFOOD DISTRIBUTION CHANNELS IN THE ATLANTIC SEA SCALLOP AND NORTHEAST MULTISPECIES GROUNDFISH FISHERIES

By

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B.A. University of Maine, 2017

A THESIS

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Science

(in Marine Policy)

The Graduate School

The University of Maine

May 2020

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An Abstract of the Thesis Presented
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Federal fisheries policy in the United States aims to balance resource conservation with maximum sustainable use. Catch shares are a quota-based management tool that are being increasingly deployed to achieve this ambitious goal. One perceived benefit of catch shares is that they give fishermen control of their catch so they will have the latitude to pursue the most profitable marketing arrangements. Using a mixed-methods approach, this research seeks to (1) describe and document the different marketing strategies that commercial fishermen in the Northeast Multispecies Groundfish and Atlantic Sea Scallop fisheries are using to sell their catch; and (2) estimate the total volume and value of seafood distributed through each strategy. This work comes after both fisheries have been operating under catch share management programs for nearly a decade and therefore represents an opportunity to investigate the question: to what extend have catch shares facilitated business expansion and market innovation for fishermen in these fisheries in practice? The findings from this study suggest that while there are examples of market innovation, at least 96% and 98% of the total volume of product within the

scallop and groundfish fisheries, respectively, are sold through conventional middlemen and that fish auctions remain the predominant mechanism for seafood distribution. Common challenges in expanding into new, alternative direct markets include operational costs, competition with foreign imports, limiting quota, and product availability. These challenges underscore the broken relationship between fisheries policy and market infrastructure, which combined are preventing fishermen from expanding into new markets.

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ACE – Annual Catch Entitlement

AS – Atlantic Sea Scallop

DAS – Days at Sea

DOH – Department of Health

FY – Fishing Year

IFQ – Individual Fishing Quota

LA – Limited Access

LAGC – Limited Access General Category

NEFMC – New England Fisheries Management Council

NGOM – Northern Gulf of Maine

MG – Northeast Multispecies Groundfish

1. Introduction

1.1 Background

Catch shares have become a common tool in fisheries management in the United States and worldwide (Bonzon et al. 2013). The first federal catch share program in the United States was for the Atlantic surf clam and ocean quahog fisheries and was established in 1990 (NOAA 2019b). Today, there are 17 federal catch share programs in the United States that include more than 25 different fish stocks. Two of these programs are located in the Northeast, United States: the Atlantic Sea Scallop Individual Transferrable Quota program and the Northeast Multispecies Sector Program (NOAA 2019b). Under catch share programs like these, shares of the total allowable catch for a fishery are subdivided and allocated to individuals, corporations, or community entities (Lynham 2014). The basic premise is that by granting secure fishing privileges to specific individuals or firms, they will have an incentive to manage their allocation responsibly, thereby encouraging the sustainable use of the resource. Catch shares have been a source of particularly polemic debate, despite their increasing ubiquity. At the center of this tension is a philosophical tug-of-war that stems from the concern that transferring fishing privileges to specific individuals or corporations is antithetical to the idea that our oceans and their resources are common pool resources that belong to society as a whole (Macinko and Bromley 2002). With this debate has come scrutiny over the efficacy of catch shares in practice and, in particular, their socioeconomic effects.

One widely observed phenomenon is that catch share programs consistently lead to the consolidation of fishing privileges and the exodus of participants, regardless of whether or not this was an objective of the project. For example, in a study of 15 federally managed catch share programs in the United States, Brinson and Thunberg (2016) found that the number of active

fishing vessels across these fisheries had decreased by an average of 24% since they were established even though this was a goal for only 8 of the programs. Such decline is often particularly acute for small-scale operators and in rural fishing communities and this often triggers a rise in industry-related unemployment (Leonard and Steiner 2017, Warlick et al. 2018)[1].

Proponents of catch shares counter this critique by pointing to the role these programs have had on improving the sustainability of fisheries and generating economic value for those who remain active participants (Birkenbach et al. 2017; Costello et al. 2008; Essington et al. 2012). We see this, for example, in the way that catch shares have lengthen fishing seasons by reducing the "race to fish", which in turn allows fishermen to fish more cleanly, thereby decreasing the overall discard rate of at-sea discards (Grimm et al. 2012). Longer fishing seasons also prevent the market from being flooded by product coming onto the market all at once, thereby helping to keep the price high and stable (Grimm et al. 2012). By giving fishermen more flexibility to choose when they fish, catch shares have also helped decreased safety risks, particularly those that are related to weather and fatigue (Huang and Smith 2014). In the Alaskan halibut fishery, for example, search and rescue missions were steadily on the rise in the years leading up to their catch share implementation but declined sharply following the implementation of catch shares (Knapp 2016).

As the debate over catch shares continues to play out, we situation our research around the question: what role do catch shares play in diversifying seafood marketing opportunities? Economic theory suggests that catch shares lead to the maximization of returns for quota holders

[1] To mitigate this problem, Section 303(A) of the Magnuson–Stevens Fishery Conservation and Management Act was amended in 2007 to create a mechanism to allocation quota to communities and regional fishery associations, but regional fisheries management councils have yet to use these provisions (Stoll and Holliday 2014).

by providing harvesters' exclusivity to the resource and flexibility to choose where, when, and how to fish and subsequently market their catch (Dewees 1998; Bonzon et al. 2010). The NOAA Catch Share Policy (2011: 9) aligns with this view asserting that "the allocation of exclusive privileges to stakeholders can help meet total allowable catch targets, reduce the negative impacts of the race for fish, promote more stable, year-round fishing, and *promote greater freedom and flexibility in fisherman business decision making* than when ACLs are used alone". Testimony provided by the Administrator for the National Marine Fisheries Service, Dr. Jane Lubchenco, in at a congressional hearing on New England Groundfish Management to the US Senate Committee on Commerce, Science, and Transportation in 2011, further supports this perspective by way of anecdotal evidence. In this testimony Lubchenco explains that fishermen in New England "are beginning to realize new entrepreneurial opportunities under sector management." She continues by describing three concrete instances where fishermen are developing new and innovative marketing strategies that create direct links between fishermen and end-consumers. These types of market entrepreneurship, which include a range of business arrangements that provide short (often direct) supply chains[1], serve two important roles in fostering coastal community resilience. First, fishermen benefit by earning higher prices for their catch (Brinson et al. 2011; Olson et al. 2014; Stoll et al. 2015a; Stoll et al. 2015b). Second, these new market arrangements act to diversify the supply chain by creating a greater range of outlets through which fishermen can sell their product. This is thought to increase coastal community resilience by lessening the impact of market disturbances, such as that which was recently observed in New England by the temporary European Union ban on spiny dogfish caused by elevated levels of toxins in several shipments (Stoll et al. 2015b). However, beyond the examples

[1] E.g., community supported fisheries, off-the-boat sales, direct restaurant sales, online sales, fishermen's markets, boat-to-school programs.

provided by Lubchenco and a general awareness that some level of market transformation is occurring in New England (Olson et al. 2014), there is an absence of empirical data on the role that catch shares play in shaping seafood distribution patterns or the extent to which it is occurring. In this study, we focus specifically on the extent to which fishermen participating in the Northeast Multispecies Sector Program and Limited Access Scallop Fishery are demonstrating market entrepreneurship approximately 10 years after these catch share programs were implemented.

1.2 Research Questions

Three central research questions guide this project:

1. What seafood distribution channels are fishermen in the Northeast Multispecies Groundfish and Atlantic Sea Scallop fisheries using to sell their catch?
2. How much product is being distributed through these different distribution channels?
3. How and to what extent has fleet rationalization shaped fishermen's marketing strategies?

2. Methods

In this study, I use a mixed-methods approach to (1) describe and document different marketing pathways that commercial fishermen in the Northeast Multispecies Groundfish and Atlantic Scallop fisheries use to sell their catch; (2) estimate the total volume and value of seafood distributed through each type of market; and (3) evaluate how marketing pathways have changed since the implementation of the catch share programs.

2.1 Study System

Figure 1. Groundfish on ice. Photo courtesy of Patrick Shepard.

2.1.1 Northeast Multispecies Groundfish Fishery

The Northeast Multispecies Groundfish (MG) Fishery is one of the oldest, historically important industries in the Northeast, United States that can be traced back almost 400 years. The MG complex consists of 15 groundfish species, including plaice, halibut, pollock, cod and wolffish, haddock, ocean pout, Acadian redfish, white, silver and red hake, and windowpane, winter, witch and yellowtail flounder (NOAA 2019c). Following a long period of high exploitation rates and overfishing in the late 60's, the groundfish fisheries were declared to be in crisis in the 1990s (Trumble et al. 2017). In 2004, the New England Fisheries Management Council (NEFMC) sought to minimize overfishing by limiting fishing days and each subsequent year the days-at-sea (DAS) that fishermen were allowed to be on the water dropped. By 2009, most fishermen were

allotted 40 or fewer DAS, a fraction of their original allotment (Brewer et al. 2017). A catch share was established in the early months of 2009 and went into effect early 2010 (Fig. 2; Brewer 2013).

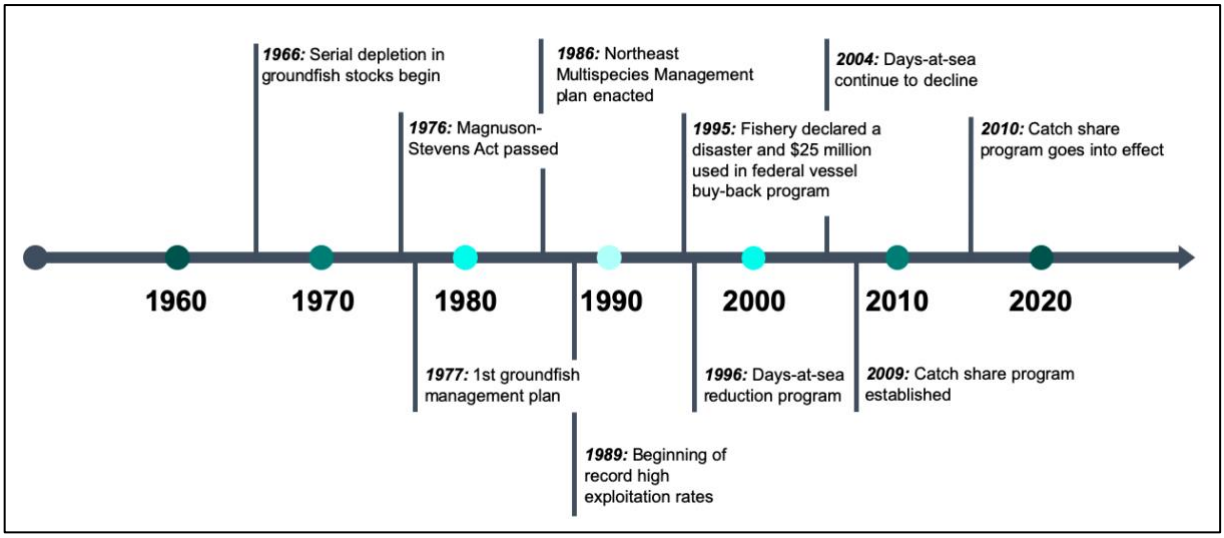

Figure 2. Timeline of regulatory changes within the Northeast Multispecies Groundfish Fishery.

To participate in the fishery and receive individual quota commercial fishermen are required to join either a sector or remain in a "common pool," where the remaining quota is pooled, and fishermen compete for access. In the sector program, each sector (a cooperative of three fishermen) receive an annual catch entitlement (ACE). This ACE is the total of the potential sector contribution (PSC) that each member of the sector brings to the table (Clay et al. 2014). The PSC is based on each individual's catch history over a certain period of time. The higher the PSC, the more quota the sector is allotted for that fishing year. Fishermen that chose not to participate in a sector fish by themselves and are considered to be in the common pool. In the first year of the program, 98% of the quota, fleetwide, was distributed to sectors (Brewer

2013). In the 1990's more than 1,000 vessels held active commercial fishing permits (Pinkerton and Davis 2015). In the 2017 fishing year (FY), there were a total of 330 MG permits (Fig. 3), with Massachusetts holding the largest number of permits (157).

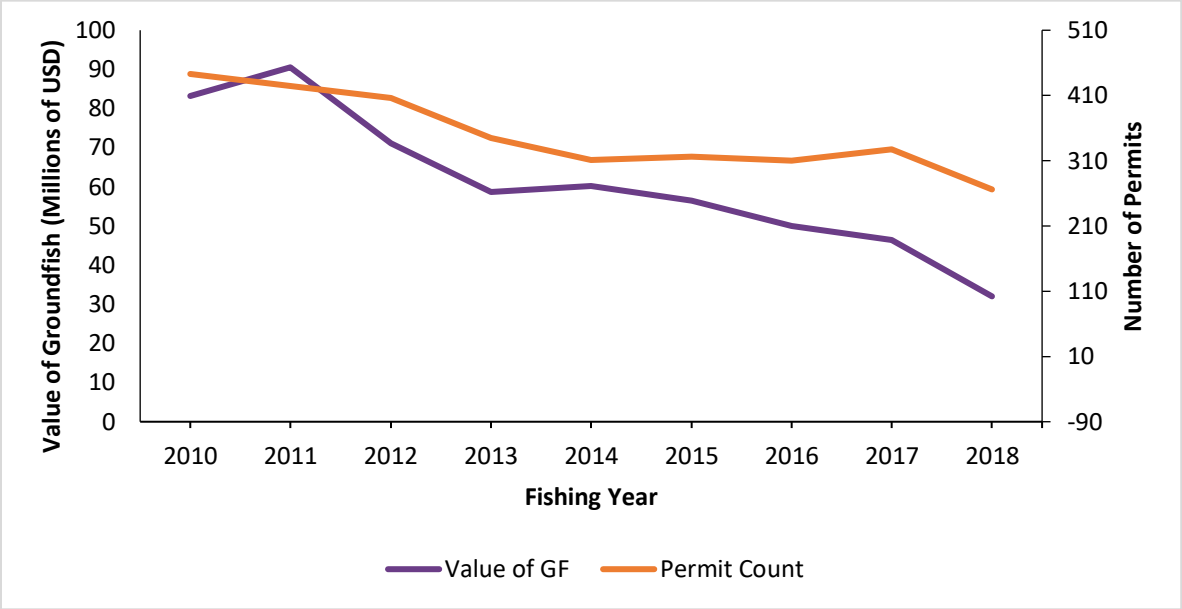

Figure 3. Number of permits within the MG fishery and the value of catch from 2010 to 2018.

The consolidation of the fleet began in the early 2000's when, as mentioned above, the regulatory action began to tighten, and fish stocks were at a low point. This loss of MG participants continues through today. Alongside this consolidation, the landings within this fishery have also dropped. There are some species, such as halibut, winter flounder, and cod that were valued at a higher price in FY 2017 at $7.90, $3.04, and $2.84/lbs, respectively. However, these are examples of species that are of higher value but are not caught in high volume due to limited quota. The combination of increased costs associated with commercial fishing and a

decrease in actual fish caught has generated an economic downturn for the MG fishery in the Northeast (Pinkerton and Davis 2015).

2.1.2 Atlantic Sea Scallops

The Atlantic Sea Scallop (AS) fishery is a year-round fishery with participants from Maine to Virginia. Fishing occurs from the mid-Atlantic to the US/Canadian border. The primary gear types utilized within the fishery are single or paired scallop dredges and, to a lesser extent, trawl gear concentrated in the mid-Atlantic region (Brinson and Thunberg 2016). This fishery was declared overfished in 1997 and the following year observed limited days-at-sea. Area closures were established between 1998 and 2001 in an attempt to control the regrowth of the scallop stock. These management measures, combined with above average recruitment and gear selection, allowed for mid-Atlantic fishing areas to be reopened. An area rotation management plan was subsequently implemented in 2004 in an effort to further increasing scallop yield. This regulatory action was implemented alongside an increased mesh size on trawls to improve scallop selectivity and reduce bycatch of groundfish species. In that same year, the Georges Bank area began to reopen as biomass appeared to be peaking. In 2008, quotas were established, and the fishery entered into a catch share program, known as an Individual Fishing Quota (IFQ) (Fig. 4; NOAA 2019a).

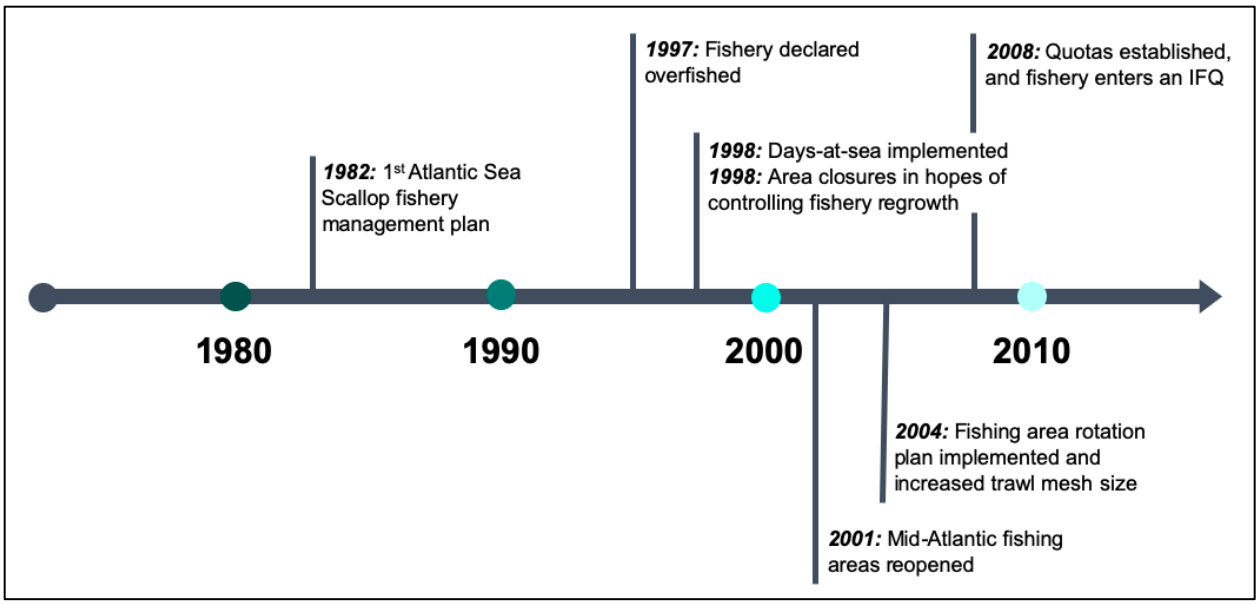

Figure 4. Timeline of regulatory changes within the Atlantic Sea Scallop Fishery.

Within the AS fishery there are three types of permits: Limited Access (LA), Limited Access General Category (LAGC), and Northern Gulf of Maine (NGOM). The NGOM management region is managed separately from the rest of the scallop stocks in the Atlantic. The LA fleet operates under a DAS and rotational areas closures. These closures allow for scallops to grow fast in higher concentrations. When areas are not closed, they are considered "open areas" where LA vessels utilize their DAS to fish for scallops. The LAGC fleet is managed with IFQ, where fishermen are allocated a quota of fish and may either fish, lease, or transfer their quota among the fleet. This portion of the fleet is allotted a number of trips into the LA access areas, however, most of their fishing occurs in the open areas. The LAGC fleet are also limited within these open areas to fish within specific exemption areas (i.e. Gulf of Maine and Mid-Atlantic Exemption Area) (NOAA 2019a).

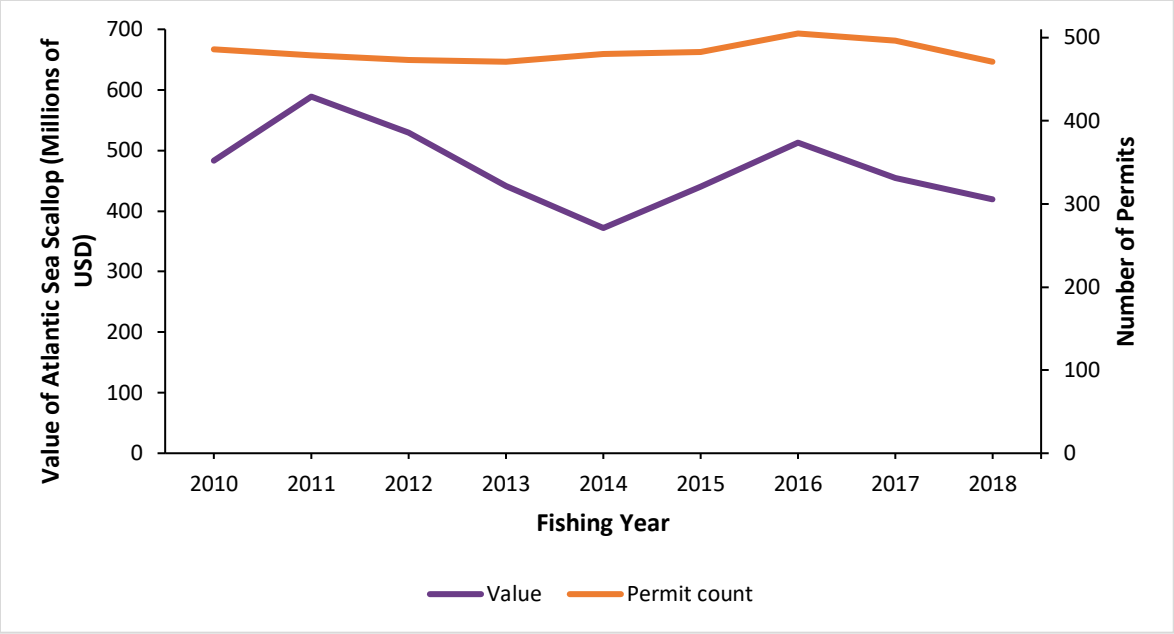

Figure 5. Number of permits in the AS fishery and the total value of harvest from 2010 to 2018.

Similar to the MG fishery, the AS fishery noted a large reduction in active vessels within the first year of the catch share program with 24% consolidation (Brinson and Thunberg 2016). In the following years, the number of participants within the fishery remained fairly consistent (Fig. 5). The primary ports for the U.S. harvest are New Bedford, MA, Cape May, NJ, and Norfolk, VA (NOAA 2012). In the 2017 fishing year 439 federal scallop permits and the price per pound averaged $9.28. Sea scallops are one of the most valuable fisheries in the Northeast Region (Brinson et al. 2011) and the fishery has been referred to as “a shot in the arm” to the region’s struggling fishing economy (Porcelli 2017).

2.1.3 Seafood Supply Chain

The success of fisheries management has been, traditionally, based in ecological studies and stock health. This research has been driven by a growing understanding of the negative

effects that increased fishing pressure has on the fish stocks (Grafton et al. 2006). Within these stock assessments, social science is increasingly becoming an important factor in evaluating fisheries, particularly focusing on economics (Beddington et al. 2007). A primary consideration within the scope of economics is labeling fishermen, not just as a pressure on the fisheries, but as a primary stakeholder in the industry. There are other actors at play, such as cutting houses, auctions, and the consumer, who are also major players and are dependent on the success of fisheries. That is to say a successful fishery goes "far beyond what happens at sea, through deeply-rooted land-based connections that are seemingly beyond control of traditional fisheries management [...]" (Pinto da Silva et al. 2017).

Evaluating the true success of a fishery is difficult if the assessment is primarily based in ecological and basic economic variables. Giving a heavier weight to those deeply rooted, land-based connections can help assess if fisheries management is contributing to the food supply and economy, as stated in the Magnuson-Stevens Fishery Conservation and Management Act (MSA 2007). In 2017, Pinto da Silva et al. conducted a study investigating the seafood supply chain of federally managed fisheries in New England. This work was designed to understand the broad connections between markets and management, in hopes of better informing and enabling awareness of seafood distribution and access to better balance the ecological, economic, and social goals of fisheries management. Pinto da Silva and Olson (2017) investigated the two fisheries of interest for this study, the MG and AS fisheries, and developed supply chain maps based on publicly available publications, interviews with various industry participants, and fisheries data. A conceptual version of the supply chain for both the MG and AS fisheries was developed based on the findings of Pinto da Silva et al. (2017) (Fig. 6).

The supply chain begins with the fisherman and the seafood is initially distributed between one of four primary market outlets: sales directly to the consumer, retail markets, institutions, and intermediate markets. From there, the product can go to a number of different market destinations, including foreign export. Neither this study, nor Pinto da Silva et al. (2017) followed the supply chain in detail to overseas locations as it was beyond the scope of the study motivation. Some of the destinations also include a version of the initial four market types, with each thread eventually ending at the consumer. While this work has described a general idea of how seafood gets to the end consumer, quantifying these layers of the supply chain has not been truly quantified anywhere recently. The focus of this study is where and to what extent is product flowing through these market channels and how has it changed since the implementation of catch share systems in the MG and AS fisheries.

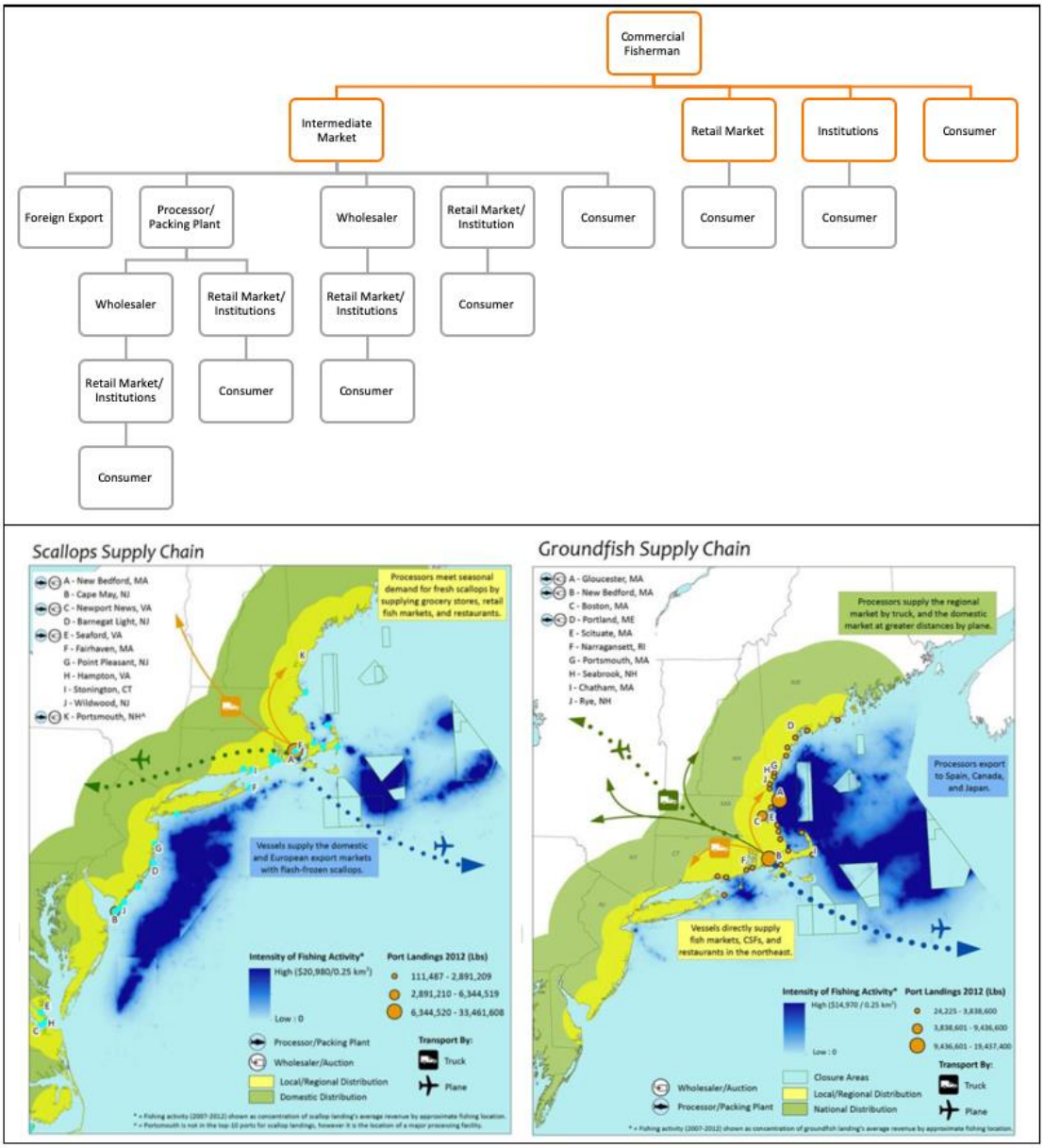

Figure 6. Generalized seafood supply chain for MG and AS fisheries based on supply maps developed by Pinto da Silva and Olson (2017).

2.2 Marketing Practices Survey

2.2.1. Survey Data Collection

A primary objective of this research was to investigate the types of market outlets that fishermen in the MG and AS fisheries use to distribute their product and to what extent and how are these marketing practices driven by fisheries policies. Following best practices by Dillman et al. (2014) data were collected using a 53-question, mixed-mode survey given to all federal permit holders active in 2017 within these fisheries. The survey was modeled after the 2015 USDA Local Food Marketing Practices Survey and focused on four distinct distribution channels: sales directly to the consumer, retail markets, institutions, and intermediate markets. In addition to asking questions about distribution, additional questions were asked about how fisher's business practices had changed and why.

Surveys were distributed using an iterative process involving several steps starting with an initial letter containing an invitation with a survey link and unique log-in. A follow-up letter was then sent to all those who had not yet completed the survey. Two weeks later, reminder phone calls were made to non-responders. That same week, paper surveys were sent to those that requested one during those follow-up phone calls. Paper surveys were then mailed to all remaining non-respondents and the following week a final round of reminder phone calls were made to any remaining non-responders.

Two datasets containing landings and contact information for participants in each fishery were obtained from the National Marine Fisheries Service. These datasets were used to produce a mailing list for the survey and link survey responses to demographic information and landings histories. There were 330 unique permits for the MG fishery and 439 unique permits for the AS fishery, for a total of 769. Of these, 296 were eliminated due to address duplication (63 MG and

233 AS). The final mailing list consisted of 267 unique MG and 206 unique AS permit holders. Only three individuals or corporations held permits in both fisheries. The survey was comprised of seven sections relating to marketing and their decision-making process: general fishing background, marketing practices, consumers, retail markets, institutions, intermediate markets, and future marketing. Questions consisted of multiple choice, open-ended responses, and Likert scales (See Appendix A for a copy of the survey).

2.2.2 Survey Analysis

Using the NOAA database, differences between survey respondents and non-respondents were analyzed on two levels (landings and boat size) using a series of ANOVAs to test the relative representativeness of the survey. Landings were then aggregated and merged with survey responses in order to estimate total contribution of each type of market outlet. Using the overall percentage of landings in each market type identified by the survey, the value of landings was then extrapolated out to the whole fishery based on total landings and value. This approach assumed a representative sample that cannot be guaranteed. However, ANOVA tests and a series of interviews were conducted to identify any potential systematic differences that might exist between those who chose to respond to the survey and those who did not.

Open-ended survey responses were analyzed using an inductive approach via qualitative analysis using NVIVO 12 for two primary topics: changes over time and factors in decision making. A coding tree was developed based on themes identified for each topic and used to analyze the open-ended responses. This type of approach allowed for the themes and discussion topics of this study to emerge through the presence of frequent and significant themes as presented by those who responded to the survey (Thomas 2006).

2.3 In-depth Interviews

Semi-structured interviews (n = 8) of willing survey participants were conducted to further investigate the factors that influence individual- and firm-level decisions on how to distribute product. An email was sent to those survey participants that provided their contact information inviting them to participate in the interview portion of this study. Of the 33 that provided their email, 15 initially responded with interest in the interview. A follow-up email was sent to the other 18 fishermen, again, with no response. Of the 15 that expressed interest, 7 responded to schedule an interview. A final follow-up email was sent to those that provided their email, unless an interview had already occurred or been scheduled. Key actors within the MG and AS, such as auctions and distributors, were also contacted in an attempt to gain market insight. An interview was conducted with one key actor directly involved in the supply chains for MG and AS. Interviews lasted between 20 minutes and an hour and a half and were conducted either in person or via phone based on availability and preference. The interviews were guided by a series of questions aimed at understanding market changes over time and the factors that influence the decisions to utilize the different market channels. Each interview was recorded and transcribed. Using NVIVO 12, the interviews were coded for common themes and used to provide a deeper context for the survey responses (See Appendix 2 for a copy of the interview questions).

3. Results

3.1 Survey Participation

We received 87 completed surveys with an adjusted response rate of 23% (MG = 48; AS = 43). This response rate is consistent with other published survey results of resource users,

which range from 15 to 35% (e.g., Chambers and Carothers 2017; Loring et al. 2013; Adams et al. 2014; Carothers 2013). Of the respondents, 56% participated in the MG and 49% in the AS fishery, with a 5% overlap participating in both. The highest overall response rate for the survey (34%), as well as the MG fishery specifically, was Massachusetts (Fig. 7).

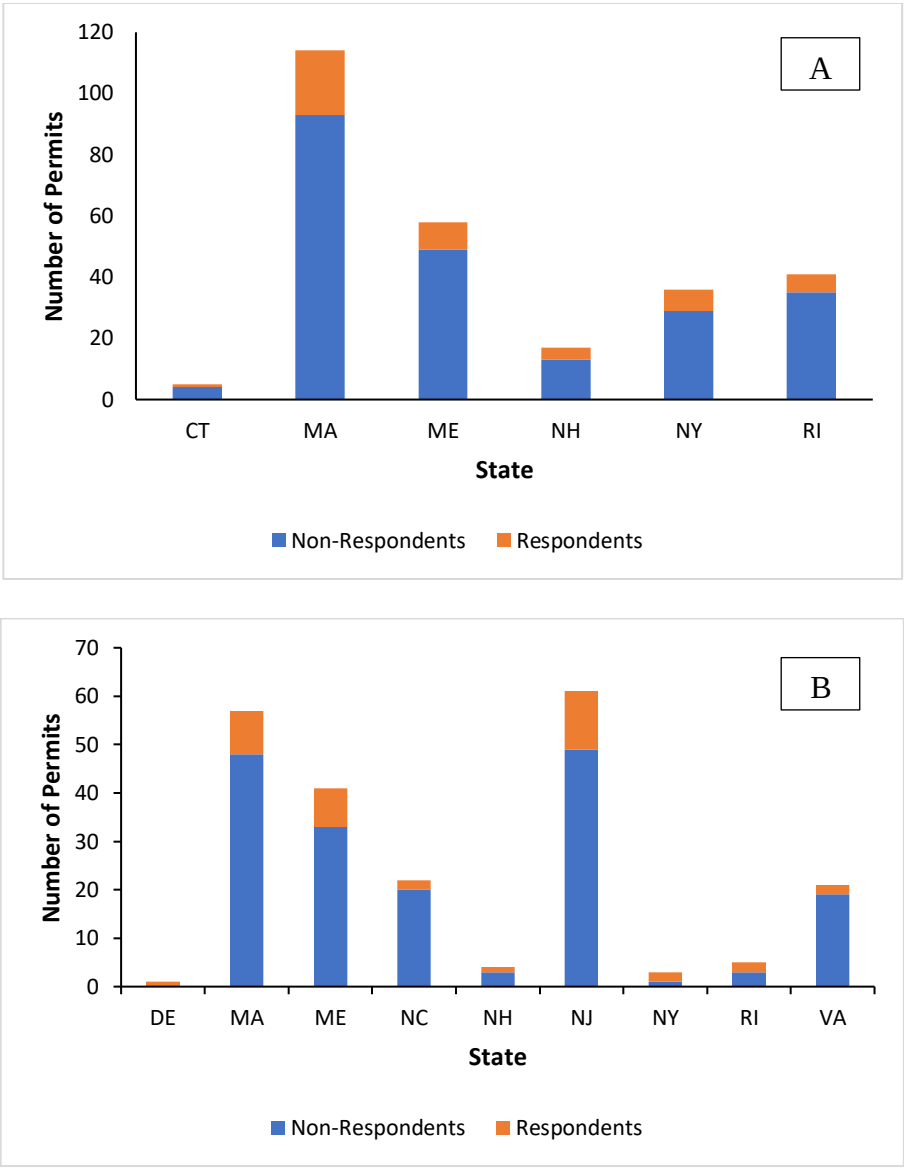

Figure 7. Number of survey respondents and non-respondents for the MGF (A) and Atlantic Sea Scallop fishery (B).

3.2 Survey Representation

One-way ANOVA tests were conducted to evaluate the extent to which respondents and non-respondents differed in key operational characteristics. These tests were designed to assess the representativeness of the survey results.

Table 1: Summary of ANOVA: Scallop Fishery

ANOVA Test	*Sum of Squares*	*df*	*Mean Square*	*F*	*P*
Vessel Size	0.51443	1	0.51443	3.371	0.0676
Value	0.00001	1	0.00001	0.000	0.9949
Vessel Size: Value	0.30309	1	0.30309	1.986	0.1601
Total	0.81753	3			

Table 2: Summary of ANOVA: Groundfish Fishery

ANOVA Test	*Sum of Squares*	*df*	*Mean Square*	*F*	*P*
Vessel Size	0.15	1	0.1481	0.990	0.3107
Value	0.83	1	0.8318	5.558	0.0191
Vessel Size: Value	0.01	1	0.0076	0.051	0.8215
Total	0.99	3			

In this analysis, a p-value of less than 0.05 was considered to be significant and was interpreted as an indicator of disparity between those that chose to respond to the survey and those that did not. This disparity could disallow detailed projection of the survey responses to the whole population, since they would not be representative. One of the three variables that was evaluated resulted in a significant p-value: the groundfish fishery value. This variable is descriptive of the dollar value (USD) that each fishing operation obtained in 2017 for the various species included in the MG. The p-value of 0.0191 indicates that the fishery value of those that responded to the survey is significantly different than those that did not respond to the survey. Upon further investigation, an ANOVA comparing the landed pounds of product of respondents and non-

respondents found an insignificant p-value of 0.229. One potential explanation for the difference in value could be that either the respondents or non-respondents' landings portfolio contained more high-valued species and was not a variable taken into account in this study.

3.3 Market Participation

Survey respondents were asked which of the four marketing strategies they used during the 2017 fishing year. For the MG fishery, 73% sold to intermediate markets, 14% to retail, and 12% to consumers. There were no survey respondents for this fishery that elected or had the opportunity to sell to institutions. The scallop fishery had very similar responses with 70% selling to intermediate markets, 19% to retail, and 9% to consumers. A single respondent from the scallop fishery sold or donated to institutions in that fishing year. Within the MG 18% of respondents participated in only two market types, while the scallop fishery had 10%. Additionally, only 5% of the MG respondents and 13% of scallop respondents participated in three marketing types. There were no respondents from either fishery that indicated participation in all four marketing types.

Using survey participants individual responses and pairing it with the landings data for the 2017 fishing year, the total value of survey respondent landings was able to be broken out between the initial four marketing categories (Fig. 8). The arrows leading to each marketing box are weighted based on the total value contained within. As mentioned above, the majority of the value is captured within the intermediate markets as 97% and 96% of the total fishery value for MG and AS, respectively. The intermediate market value, based on respondents' answers and landings data, is orders of magnitude larger than the other three market types (Fig. 9).

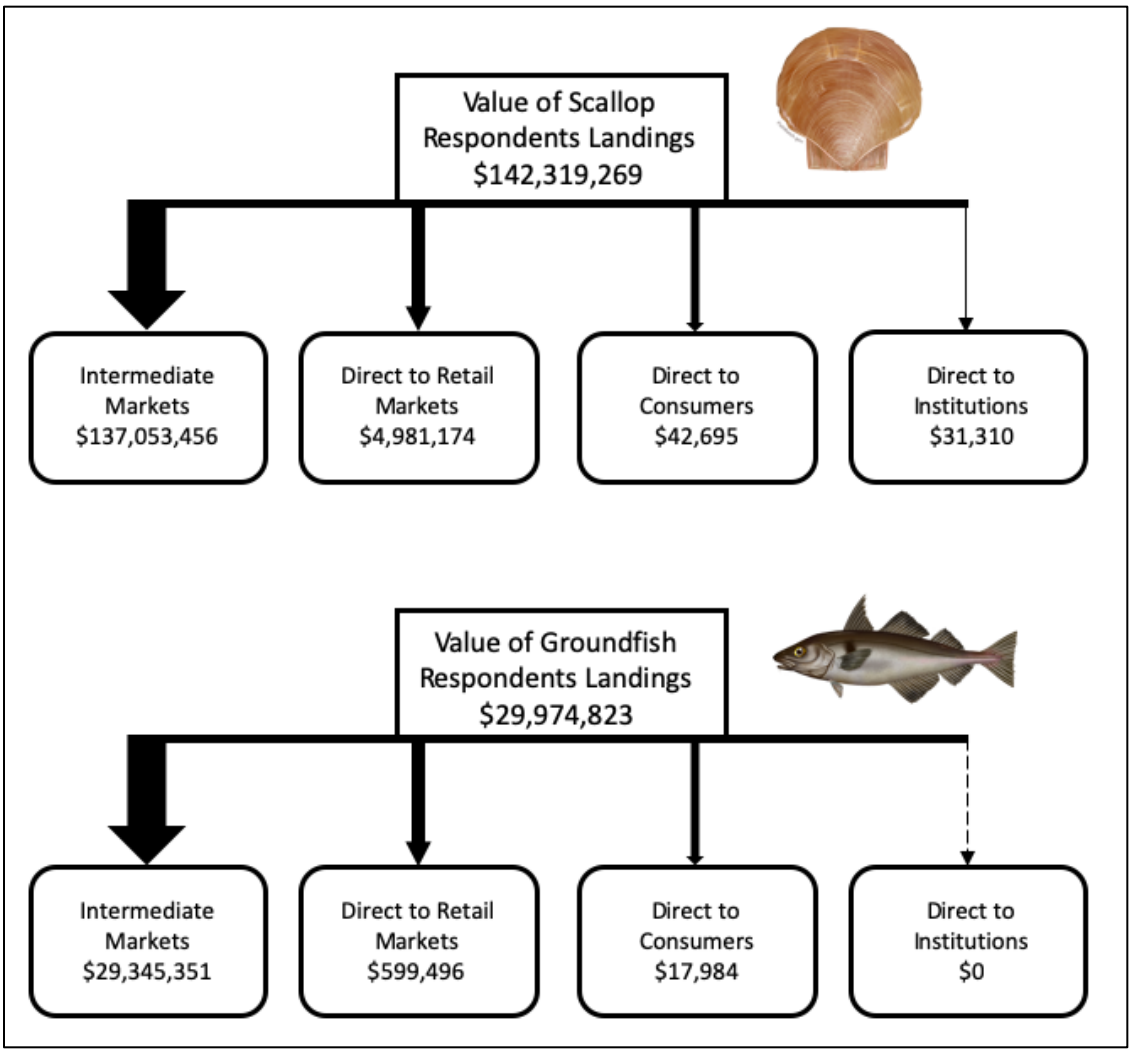

Figure 8. Northeast fisheries market value (USD) distribution for survey respondents within the MG and AS fisheries for the 2017 fishing year. The arrows are weighted relative to the value captured within each box and the number of respondents that indicated their sales percentages to each market are notated below each box.

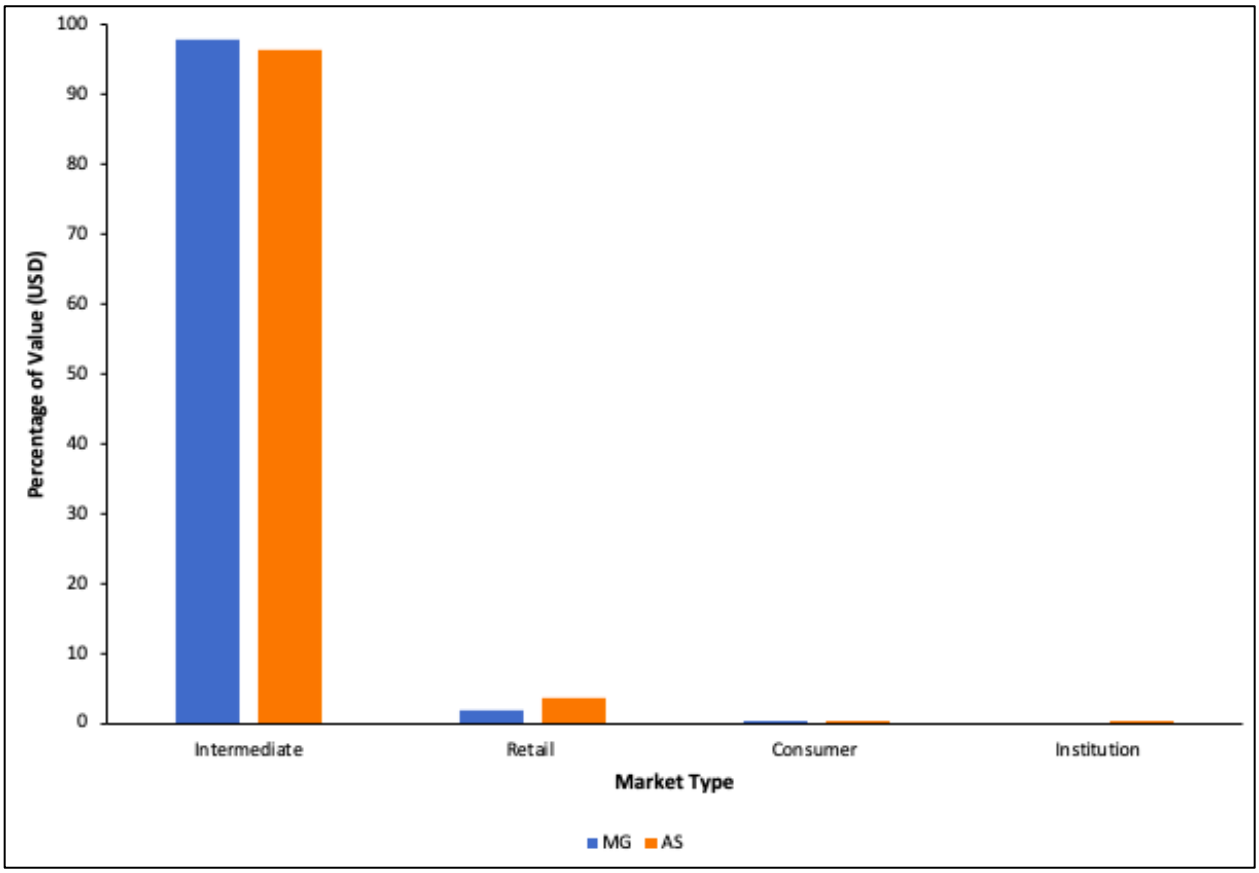

Figure 9. Percentage of total value (USD) of the MG and AS fisheries for each market type.

3.4 Changes Over Time

The primary themes identified by survey participants related to changes over time included pricing, fleet consolidation, markets, and imports (Table 3). While participants identified a number of changes, those discussed by 4 or more fishermen were selected for inclusion in this discussion. There were certain themes that emerged solely from the responses of MG participants, which have been separated from those related to both the MG and AS fisheries. Responses to interview questions were also a part of this analysis in order to provide more context for the themes identified in the survey. It should also be noted that not every participant

chose to answer every open-ended question, at most 57 participants elected to answer one of them. One, non-open-ended question that nearly every respondent answered was "Have your marketing and/or sales strategies changed since 2010?" The majority of respondents (72%) said no, 24% said yes, and 4% elected not to answer the question.

Table 3. Summary of all themes in observed changes over time and the number of survey respondents that discussed each theme across questions (i.e. A participant that discussed consolidation in two different questions was only counted as n = 1). Themes notated with an * are specific to the MG fishery.

Theme	n (# of Respondents)	Example
Price and Costs	n = 30	"The price of fish has declined and the overall expenses of fishing for product has continued to rise"
Markets and Product	n = 19	"Not a steady supply. Losing markets because of this."
Consolidation*	n = 7	"[...] consolidation occurs as small boat owners go under."
Quota Shifts	n = 3	"[...] they took 90% of our fish away."
Aquaculture*	n = 1	"Farm raised fish [...] also have an effect."

The majority of respondents mentioned both changing prices within the market, as well as shifting costs related to running their business. Second, MG participants discussed consolidation of the fleet and the impact felt on the fishery. Third, changes in the markets and product availability have been observed over the years. Each of these emerging themes is discussed in detail below.

3.4.1 Price and Costs

Shifts in price has been a major driver of change for fishermen participating in the MG and AS fisheries. Survey respondents in both fisheries noted a decrease in price per pound of product. One respondent compared the price obtained today to similar prices seen in the 1980s, despite changes in the industry and the receiving markets. The low prices that fishermen are receiving when they land their fish are ultimately leading to a rise in the cost to fish. There appeared to be some sort of consensus regarding increased operational costs between the two fisheries, with a little over 1/3 of respondents making some mention of it within their responses. Regarding this, one fisherman stated:

> The price of fish has declined and the overall expenses of fishing for product has continued to rise. Numerous and constant cuts in choke species quota have raised lease prices beyond profitability to pursue the entire allocation.

According to the respondents there is no balance between dockside prices and the costs to operate their businesses. The increased costs related to leasing of quota, as mentioned above, were mentioned by a number of fishermen, specifically in the MG fishery. The participant quoted above referenced “choke species”, which can be defined as the species with the lowest allocated quota in a multispecies fishery. For many cases in the Northeast, the choke species that is often referred to is cod. The low allocation of “choke species” quota is often designed around conservation and recovery efforts (Schrope 2010). Choke species are of concern for a few participants because of their catchability and the high lease price for the extra quota. These high lease prices do not strike a financial balance with the price obtained for the catch.

In relation to other assorted costs, one interviewee discussed the rising price of fuel and increasing costs of ice and how they impact his day-to-day operations:

> We used to get ice for free and now you have to buy it. It's a pain [...] because for me it's 20 bucks [of ice] a trip. So that's 20 bucks on ice, 30 gallons [of fuel] in the boat, 20 gallons [of fuel] in the truck towing the boat, getting about 6 miles to the gallon. And then you have your time. Some days I work for negative.

This fisherman also noted that some fishermen, in order to cut costs in the long term will invest in an ice machine rather than paying someone else for ice for each trip they took. He noted that most of those vessels he spoke of were larger operations that had the financial ability for the investment and that many smaller vessels would not be able to afford the investment with the current prices for fish.

3.4.2 Consolidation

The consolidation, or shrinking, of the MG fleet in the Northeast is a common topic when discussing changes observed within this particular fishery. Many groundfishermen that participated in the survey have observed the steady disappearance of smaller operations, with the fear that this consolidation will wipe out the small, day-boat fleet completely. Regarding the shrinking fleet, one fisherman noted that the catch shares policy within the MG fishery is a cause for concern:

> Catch shares are an interim measure until the consolidation occurs as small boat owners go under. Catch [shares] is all about consolidation and fueled by the restriction and cutting of quotas. 2014 was supposed to bring bounty to all without additional quota. Only the larger quota holders will survive. In 10-15 years fishing here [the Northeast United States] will look like it does now in Alaska with corporate boats controlling everything.

On this topic, one interviewee noted that many of the people he knew left the fishery and sold their permits "because it wasn't worth it anymore" due to the limited quota and "ever increasing costs."

However, fleet consolidation is not the only shrinkage occurring within the industry. Infrastructure of dockside facilities is also being lost including ice houses, cutting facilities, and landing facilities. One participant noted that this loss is making it even more difficult to participate in alternate markets, as he could not find anyone willing to fillet smaller fish for him to bring to food markets. The loss of ice houses also sits heavily with many small-scale fishing operations in the MG and AS fishery. As mentioned above, ice used to be fairly inexpensive with the presence of ice houses, but their leaving has left fishermen seeking out more costly ice. Consolidation of dockside infrastructure could also be a major factor in decision making for fishermen deciding where to sell their catch to. The consolidation of the fleet and infrastructure is not just impacting costs, but the market participation and product availability as well.

3.4.3 Markets and Product

At the September 2019 New England Fisheries Management Council meeting, Libby Etrie made the comment that once a market is lost within the fishing industry it is difficult to get

back. Relationships between a fisherman and a buyer is one that is developed over time through trust, good quality product, and consistency. Product availability refers to the seafood available for markets to purchase from fishermen, which has been on the decline since fleet consolidation began and quotas were routinely cut. This inability to promise a consistent supply of product to various buyers has led fishermen to seek other buyers that are okay with this fact. Again, one respondent points to catch shares:

> In 2010, when catch shares started, we had a lot of fish. In 2013, when they took 90% of our fish away, we lost 70% of the boats and lost our markets because the fish dealers went to look for fish elsewhere because we can't supply them.

In the absence of fresh product to buy, and subsequently sell, buyers have been turning to alternate sources of seafood, namely cheaper, frozen imported product. Quite a few of the groundfish respondents pointed to these foreign imports impacting, not only their ability to sell, but often the price they are able to obtain for their fresh catch. This feeling was mirrored by all of the MG interviewees. One interviewee discussed a time in the early 2000s when he sold his product to a neighbor's restaurant:

> They had a chef who was really on top of it. He would give a talk to all of the waiters every night when they had fish, tell them about the boat and the trip, so when somebody said where do you get your fish, it was an actual thing. They could actually tell them about the boat and the fish. Eventually they went to Iceland [Icelandic fish].

This fisherman pointed to the lower prices that imported fish hold as the reason he lost this business. The steadily increasing reliance of foreign imports for seafood appear to be making a significant impact on domestic seafood sales, particularly in the MG fishery in the Northeast.

On the other side of this coin, lack of fresh and locally caught seafood has provided a few with an opportunity. One AS fishery respondent noted that less product on the market can actually be beneficial to his income when consumers do not have a lot of other options for fresh seafood purchases:

> There are a lot less fresh scallops on the market since most of the day boats were eliminated from the fishery, particularly in the Delaware/Maryland area, therefore I can ask I higher price for sales direct to consumers since they have very limited availability to fresh product.

While there was this note of positivity, the overall feeling of the respondents and interviewees from both fisheries was that foreign imports have turned buyers away from paying a higher price for locally caught, fresh seafood when they can purchase imported, frozen product for a much lower price.

The final piece of this are the changes that the markets themselves have undergone. One interviewee discussed his history with the fish auctions in New England. He said that when he first started selling to an auction in Massachusetts in the late 90s there was an auctioneer present when there were fish to sell. He said that it was very "similar to an estate auction", where the auctioneer says "Sold!", bangs the gavel, and moves on to the next lot of fish. He had a great appreciation for the auction in that buyers were present and could see the fish they were about to buy:

> The great thing about the display auction was that buyers could come in and look at our fish. Haddock are a pretty fragile fish: they bruise easily their scales come right off and they're very tender and if you abuse them at all in the catching process, in a dragger they get scaled by the net or other fish rubbing against them, they get bruised, they're being towed around for a couple hours, then get dropped on the deck. So, the fish are almost unrecognizable sometimes, whereas our fish are handled one-by-one [...]We always set the high price at the auction.

One thing this fisherman appreciated was the ability to contact the buyer of his fish, ask them what they thought of the product, and if there was anything he could do to improve the quality of the fish for the next auction. He acted as his own customer service department. This particular auction shifted to an electronic system in the early 2000s, taking away that visual of fish from the buyers. He has not sold to an auction since the early 2000s but mentioned that he likes business model of the fish auction in Portland, ME because they have maintained the buyer-fish visual link and are transparent about the prices and costs of doing business there. He also noted that the number of fishermen he knows that sell to the auctions has decreased over the years. This seems to be the trend as more fishermen make the switch to wholesalers or alternative markets.

3.5 Factors in Selling

In addition to changes over time, this study highlighted a number of factors that influence who fishermen in the MG and AS fisheries currently sell to and who they have sold to in the

past. Three primary themes emerged from the fishermen's discussion (Table 4). The first factor is the market itself. The second is the price fishermen are able to obtain and how it balances with their costs, and the third is limiting policies.

Table 4. Summary of all themes of questions related to factors in selling and the number of survey respondents that discussed each theme across the survey (i.e. A participant that discussed limiting policy in two different questions was only counted as n = 1).

Theme	n (# of Respondents)	Example
Price and Costs	n = 32	"I would fish when the price of fish warrants the effort."
Market Behavior	n = 26	"Selling to the co-op limits most factors with some species being controlled by the buyer."
Limiting Policy	n = 6	"My state has very strict DOH [Department of Health] regulations that limit innovative marketing strategies [...]"
Quota Availability	n = 3	"Availability of quota to lease."
No choices	n = 1	"We have no choices."

3.5.1 Price and Costs

Price obtained per pound of product landed is the primary factor in fishermen's market decisions. Price, like convenience, has a lot to do with the buyer and their relationship with the fisherman. One respondent said that "we have to sell to the fish house where we dock our boats [and] in return the dockage is free." This specific type of relationship can help offset the costs associated with operating their businesses and is an added convenience for fishermen. A good relationship and reputation with a specific buyer can provide fishermen with a higher price per pound of their product because they know the care that is given to the product.

Between the two fisheries, price is one of the primary drivers in deciding who to sell to. There is some disagreement on to who offers the best price, the auctions or the wholesalers. The price obtained by each fisherman might be contingent on the relationship and history between them and the buyer, as well as the time of year selling. Some respondents noted that the price during the summer is dependent on the number of tourists coming through due to increased demand. This is to be balanced with good weather and the flooding of markets.

3.5.2 Market Behavior

The second major influencing factor in fishermen's decisions appears to be the market itself, specifically as it relates to convenience, relationships with buyers, and product and quota availability. Convenience seems to be the primary contributing factor, with many of the respondents noting that having a facility that will help with offloading their catch, selling it, and paying them within a reasonable time frame is key. One respondent, when asked about what factors influence who he sells to, said "I have built up rapport with my two wholesalers by providing excellent product that is well taken care of." These relationships are contingent on product quality and trust built over a period of time. This name recognition and product quality appears to be how many fishermen are able to secure a higher price. One interviewee discussed how his relationship with his wholesaler helps his business:

> He knows my fish are always cared for, so I'll get a little extra in price. My fish will stay local when they can which gives you more money because they're not shipping it to the base auction. They don't have that shipping charge to go on it. They're paying the same but there's more money in my pocket because it costs them less per pound.

This interviewee went on to discuss the infrastructure surrounding his wholesaler. Because his wholesaler is buying fish directly from the fishermen, he is able to cut costs by avoiding shipping charges from buying from the auctions or other retail outlets. This allows him to pay his fishermen more per pound and foster relationships with those who pride themselves on quality. This fisherman also sells to other wholesalers, many of whom he does not have a long-established relationship with. He said about these wholesalers:

> As far as the wholesaler it's a crapshoot on what you'll get for price because there's the market price. I'll get $6.50 but some other guys will get $9 despite the quality. It's about who you know. Name recognition is a lot.

Name recognition is important in building new market relationships. As mentioned above, respondents noted that these new relationships are difficult to develop in recent years and is only exacerbated by quota cuts and inability to supply consistent product.

Another market related factor influencing fishermen's selling decisions is the timing of daily landings and/or the time of year. A few respondents talked about the timing of landing their fish when it comes to dealing with wholesalers, fish auctions, and cooperatives. As it relates to wholesalers and auctions, the more total product and amount of specific species being landed in a day by multiple boats, the lower the payout the fishermen are likely to get because of a flooded market. This is compounded with the fact that good weather means more people out fishing and, when specifically discussing auctions, timing coming back to port with days closer to auction to allow for a higher quality product. Speaking to sales of cooperatives, one fisherman said,

"Selling to the co-op limits most factors, with some species being controlled by buyers." So, while a fisherman might gain a higher price for their catch, those species not desired by the consumer might not maintain a high price or even be purchased by the coop.

Sales dictated by consumers can prove to be a separate issue on its own, with some species being highly undesirable. One such example is dogfish, small coastal sharks. This species while not included in the MG or AS fisheries, has permits and quota available. Many MG fishermen also have a permit to harvest dogfish, as they are easily caught alongside the species included in the MG complex. One fisherman shared his experience in marketing the dogfish he caught:

> The best example of current state of dogfish marketing is we actually got an SK grant to try to market them and gave them away for free to local Cape Cod restaurants, about 24 in 2018. So, when we wrapped up in 2019, we asked people if they wanted to do the program and get free fish, 19 of the 24 said even its free, they hated the dogfish.

This fisherman did not share if the dislike of the dogfish came from taste or preparation methods. It has been reported that dogfish is similar, in taste, to codfish, but the aversion to it in this instance is unknown. Another fisherman with experience in attempting to market dogfish said that he believed it came down to consumer knowledge. He said that because people are unfamiliar with it, they are reserved in buying it. The fishermen that were interviewed did not have any clear solution to the problem of marketing undesired species other than telling the consumer to educate themselves on new products and to try it for themselves before passing judgement.

3.5.3 Limiting Policy

The final factor identified by respondents of the survey is limiting policy. Where fishermen can sell to is restricted by who has a dealer permit. If the fisherman has a dealer permit, they may sell to whomever they wish, but if they do not, they are fairly limited. One fisherman pointed out that even if a buyer or fisherman has a dealer permit, they have to have the required facilities necessary to process and store product that meets the Department of Health's (DOH) requirements. These health department regulations were called out by one respondent: "My state has very strict DOH regulations that limit innovative marketing strategies for commercial catch of groundfish." A few other respondents pointed to state level DOH requirements as limiting their business expansion into new markets to help grow their income.

Having a dealer's permit is a great asset to a fisherman's business. Obtaining one, on the other hand, is a long process. Each fisherman that was interviewed made sure to mention the mountains of paperwork and the financial investment that is involved in acquiring one. One fisherman discussed the investment and extra work that would go into maintaining a dealer's permit. Such a permit could open doors for many individuals looking to expand to new markets:

> If I could sell directly to other restaurants or consumers that would be a major benefit to my business for sure. I mean right now to be able to sell to any restaurants or fish markets that don't have a dealer permit I'd have to have a facility with freezers and refrigerators and trucks, there's a lot to it, it's a whole other phase, but so it really limits how much direct to consumer sales we can do, which is unfortunate.

The financial barrier is likely to be the primary deterrent for many fishermen. For others, the paperwork involved in getting the permit is enough to turn them away. One fisherman said that a full year of paperwork was needed in order to sell their product to a Wholefoods distributor. He said that the process of obtaining a dealer permit would be even longer with the amount of paperwork that needs to be done. Another fisherman cited that he already has enough paperwork to do annually for his permits, boat, and landings that a dealer permit would only add more each time he landed fish:

> [...] all that paperwork you'd have to fill out? I already have enough of it. I get to the fish market, it's an extra 10/15 minutes doing the federal paperwork and they won't take it without the vessel trip report copy. It's a lot for them too. Some will let me take a picture of it and send it to them.

All of the fishermen that were interviewed made some mention of the restrictions put in place by holding, or not holding, a dealer's permit. It's limiting on both ends of the spectrum in that different retail outlets, such as restaurants, wanting to do business with fishermen can only do so if one party has the dealer permit. It is the same with sales directly to consumers, except the consumer need not have a dealer permit, but the fisherman must. It appears to be the same across most states in the Northeast.

4. Discussion

For managers, one of the draws of catch shares has been the idea that they create space in the market for fishermen to be entrepreneurial and diversify their businesses practices (Knutsson

et al. 2016). The research presented in this thesis investigate this assumption, exploring seafood marketing practices of participants in two key fisheries in New England. Using a mixed-methods approach, I found that only 11% of fishermen participate in direct to consumer marketing, representing 1% of the groundfish and scallops that is currently being sold. Further, less than 20% of respondents overall indicated participation in two or more market types, with 96% of the fishermen participating in intermediate markets alone. These finding stands at odds with the theory of change that underlies catch shares, which posits that transferring fishing privileges to individuals and corporations will liberate harvesters, enabling them to explore new marketing outlets.

This does not mean that the market structure has not changed. Three quarters of the respondents indicated that in the last 10 years their marketing practices have changed. An important caveat to my research and one which requires further investigation how the role of the "middlemen" has changed since the implementation of the catch share programs. Companies like Red's Best are an example of a dealer that has emerged and functions as a direct marketing campaign for fishermen, purchasing their product and selling it as hyper-branded product that capitalizes of the specific stories of harvesters. Intermediate markets are traditionally aggregate platforms for seafood, but there are different levels that exist with the market type. This is the next level of analysis, beyond the primary, first tier markets, that should be analyzed thus expanding our knowledge on the seafood chain in the Northeast United States.

One possible explanation for why there has not been a proliferation of alternative marketing strategies since the implementation of catch shares is that fishing access (i.e., quota) alone does not dictate how, when, where, and to whom fishermen sell their catch. In part, other formal rules and regulations play a key role. For example, the state of Maine prohibits

groundfish vessels from landing lobsters that they catch while trawling, but no such rule exists in the rest of New England. This has caused some fishermen to move their fishing operations to Massachusetts so that they can keep and sell their by-caught lobsters. Those who sell their catch directly to consumers also have to hold a dealers license, which can be a financial barrier and a logistical hurtle that some fishermen simply do not want to deal with. Many of the fishermen that participated in the survey, as well as those interviewed, found that the cost and process of obtaining a dealer's permit was more trouble than it was worth. Fishermen also found it frustrating that they are unable to connect with their communities in the way they would like to, limited by the choices of licensed dealers and forced to sell to intermediate markets.

There are also non-regulatory constraints that influence how seafood is sold. Based on fishermen's experiences over the years there are a number of factors that can describe the structure of these markets within the fisheries. For example, intermediate markets tend to maintain consistent prices and provide a higher level of convenience for fishermen by the way of docking, ice, and being a "one stop shop" compared to alternative markets. Fishermen also develop relationships with their buyers and depend on them for fuel, docking space, and other critical infrastructure. These benefits are vital to sustaining fishermen's operations and therefore fishermen are often cautious about jeopardizing these relationships in pursuit of new market opportunities. This dynamic pushes fishermen towards those traditional, intermediate market locations.

Another limitation of these alternative markets is that they are often dictated by the end consumer. Exposure and education seem to be a large portion of the key to unlock those smaller markets. Education of the consumer has been discussed as an important factor in opening up these smaller markets more readily to fishermen. A study conducted by Witkin et al. (2015)

investigated consumer choice in selecting seafood and indicated that familiarity of the species, as well as knowledge of preparing it, effected the purchase. Additionally, the infrastructure to sell directly to retail markets and institutions is largely unavailable to fishermen. Many restaurants and hospitals, for example, buy their fish "locally" but through third-party dealers with purchase history rather than straight from the fishermen. These, seemingly already limited, types of sales are typically concentrated within the coastlines. It is more difficult to get locally caught seafood unless the institution or retail location are within close proximity to the offloading areas (O'Hara and McClenachan 2019). Confounding this is the consolidation of the fleet, as well as market locations for fishermen to sell their product and, in turn, business to buy seafood from. The transformation of the waterfront to contain fewer physical market locations can prevent local businesses from shopping around for their seafood and buying directly from local dealers. This is more of an issue for those mentioned above who are not located in the general area of the dealer. This is another instance where companies like Red's Best purchase local seafood and distribute it to businesses that may not be able to obtain local seafood otherwise.

It would appear from this study that it is a balance of both catch shares and the entrenched nature of market systems that is has limited to diversification of markets. Excluding catch shares at the moment, other policies (i.e. state/federal seafood handling regulations and seafood imports) are a big factor in fishermen's inability to expand to new markets. Being required to sell to a licensed dealer for health and safety reasons is not the target of fishermen's frustration. The time and cost to obtain and maintain is the limiting factor for fishermen, specifically the paperwork and facilities required by the state and federal regulators to obtain such a license. If a small-business fisherman was able to obtain a dealer's license he or she could, in theory, sell to whoever they wanted to (i.e. directly to consumers). A constant supply of

imported seafood is also a limiting factor in that many businesses opt for the cheaper imported product. The policies surrounding seafood imports were not explored in great detail for this study, but they are an important contributing factor to consider for further market research. This consistent supply offered by imported seafood is where catch shares come in. Due to quota restrictions in order to protect the wild stocks of groundfish and scallops, most of the fishermen interviewed in this study find themselves unable to provide consistent supply to those markets that require it (i.e. restaurants and institutions). The consolidation of the markets over the years, quota restrictions, as well as seafood handling regulations, have left fishermen with few options in the Northeast, leading most of the fishermen to sell to the traditional intermediate markets.

4.1 Conclusion

This study focused on the market composition surrounding the MG and AS fisheries in the Northeast United States and the factors that have influenced fishermen's sales strategies. While some research has been done surrounding the market structure, little has been done to estimate the amount of seafood being sold through different marketing types. As this study found the majority of fishermen have not diversified their distribution strategies in the past 10 years since catch shares were implemented and the vast majority sell primarily to intermediate institutions. Policymakers anticipated that catch shares for the MG and AS fisheries would help fishermen expand marketing strategies and be more profitable. However, results from this research suggest that this has not occurred to this point. However, with the recent increase in local and direct seafood marketing that has been spurred by the COVID-19 pandemic, there may be a window of opportunity for some harvesters.

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Appendices

Appendix A. Marketing Practices Survey

1. In the 2017-2018 fishing year, did you (or the operation you represent) participate in either of the following fisheries?

☐	Northeast Multispecies Groundfish Fishery	**Please continue to Question 2**
☐	Atlantic Sea Scallop Fishery	**Please skip to Question 5 on Page 4**
☐	Both	**Please continue to Question 2**

2. In the 2017-2018 groundfish fishing year, were you in any of the following:

☐	Sector Program	**Please continue to Question 3**
☐	Common Pool System	**If you were in the common pool system ONLY, please skip to Question 5 on Page 4**

3. Which sector(s) were you in during the 2017-2018 fishing year. Please include all sectors in the space below.

4. Please write the year when you first joined a sector in the space below.

5. In the 2017-2018 scallop fishing year, were you in any of the following:

☐	Limited Access (LA) fishery
☐	Limited Access General Category (LAGC) fishery

6. In the 2017-2018 fishing year, which ONE state did you land in most frequently?

7. What was your home port in that state during the 2017-2018 fishing year?

The next set of questions is about Marketing Practices.

8. In the 2017-2018 fishing year, did your operation catch and sell any product to any of the following: *(check all that apply)*

☐	**Consumers**: such as farmers markets, roadside stands or stores, and Community Supported Fishery (CSF)
☐	**Retail markets**: such as supermarkets, supercenters, restaurants, caterers, independently owned grocery stores, and food cooperatives.
☐	**Institutions:** such as K-12 schools, colleges or universities, hospitals, workplace cafeterias, prisons, and foodbanks.
☐	**Intermediate markets:** such as businesses or organizations in the middle of the supply chain marketing locally - and/or regionally-branded products) such as distributors, auction houses, wholesale/terminal markets, and food processors.
☐	**None of the above** – **Skip to Question 32 on Page 15**

9. What percentage of your catch (by volume) do you sell to each of the following:

Consumers: such as farmers markets, roadside stands or stores, and Community Supported Fishery (CSF)	**%**
Retail markets: such as supermarkets, supercenters, restaurants, caterers, independently owned grocery stores, and food cooperatives.	**%**
Institutions: such as K-12 schools, colleges or universities, hospitals, workplace cafeterias, prisons, and foodbanks.	**%**
Intermediate markets: such as businesses or organizations in the middle of the supply chain marketing locally - and/or regionally-branded products) such as distributors, auction houses, wholesale/terminal markets, and food processors.	**%**

The following set of questions is about Direct to Consumer Sales.
If you did not sell directly to consumers, please skip to Question 15 on Page 8

10. In the 2017-2018 fishing year, at which outlets did you sell directly to consumers? *(check all that apply)*

☐	**Farmers markets**
☐	**Roadside Stores or Stands**
☐	**Community Supported Fisheries**
☐	**Some other direct to consumer method**
☐	**None of the above – Skip to Question 15 on Page 8**

If you used some other direct to consumer method, please use the space below to specify.

11. In what year did you first catch and sell product directly to consumers?

12. At how many separate locations did your operation sell your catch during the 2017-2018 fishing year?

Farmers markets	
Roadside Stores or Stands	
Community Supported Fisheries	

13. In 2017-2018 how many miles (one way) was your operation located from your largest ($) seafood buyer?

Farmers markets	**mi.**
Roadside Stores or Stands	**mi.**
Community Supported Fisheries	**mi.**

14. Of your direct to consumer sales, what percentage do you sell to:

Farmers markets	**%**
Roadside Stores or Stands	**%**
Community Supported Fisheries	**%**
Other direct to consumer methods	**%**

The following set of questions is about Retail Market Sales.
If you did not sell directly to a retail market, please skip to Question 20 on Page 10

15. In the 2017-2018 fishing year, at which outlets did you sell directly to retail markets? *(check all that apply)*

☐	**Supermarkets or grocery chains**
☐	**Restaurants or caterers**
☐	**Some other direct to retail market** *such as independently owned grocery stores, food cooperatives, small food stores, etc.*
☐	**None of the above – Skip to Question 20 on Page 10**

If you used some other direct to retail market method, please use the space below to specify.

16. In what year did you first catch and sell product directly to retail markets?

17. At how many separate locations did your operation sell your catch during the 2017-2018 fishing year?

Supermarkets or grocery chains	
Restaurants or caterers	

18. In 2017-2018 how many miles (one way) was your operation located from your largest ($) seafood buyer?

Supermarkets or grocery chains	**mi.**
Restaurants or caterers	**mi.**

19. Of your direct to market sales, what percentage do you sell to:

Supermarkets or grocery chains	**%**
Restaurants or caterers	**%**
Some other direct to retail market	**%**

The following set of questions is about Institution Sales.
If you did not sell directly to an institution, please skip to Question 25 on Page 12

20. In the 2017-2018 fishing year, at which outlets did you sell directly to an institution?
(check all that apply)

☐	**K-12 schools** *such as Kindergarten, Elementary, Middle, Junior High, and High Schools*
☐	**Colleges or universities**
☐	**Workplace cafeterias**.
☐	**Some other institution** *such as Prisons, Food Banks, Hospitals, etc.*
☐	**None of the above – Skip to Question 25 on Page 12**

If you sold to some other institution, please use the space below to specify.

21. In what year did you first catch and sell product directly to institutions?

22. At how many separate locations did your operation sell your catch during the 2017-2018 fishing year?

K-12 schools	
Colleges or universities	
Workplace cafeterias.	
Some other institution	

23. In 2017-2018 how many miles (one way) was your operation located from your largest ($) seafood buyer?

K-12 schools	**mi.**
Colleges or universities	**mi.**
Workplace cafeterias.	**mi.**
Some other institution	**mi.**

24. Of your institutional sales, what percentage do you sell to:

K-12 schools	**%**
Colleges or universities	**%**
Workplace cafeterias.	**%**
Some other institution	**%**

The following set of questions is about Intermediate Market Sales.
If you did not sell to an intermediate market, please skip to Question 32 on Page 15

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25. In the 2017-2018 fishing year, at which outlets did you sell directly to an intermediate market? *(check all that apply)*

☐	**Distributor**
☐	**Auction House**
☐	**Wholesale or Terminal Market**
☐	**Food Processor**
☐	**Some other direct to intermediate market**
☐	**None of the above – Skip to Question 32 on Page 15**

If you sold to some other intermediate market, please use the space below to specify.

26. In what year did you first catch and sell product directly to intermediate markets?

27. At how many separate locations did your operation sell your catch during the 2017-2018 fishing year?

Distributor	
Auction House	
Wholesale or Terminal Market	
Food Processor	

28. In 2017-2018 how many miles (one way) was your operation located from your largest ($) seafood buyer?

Distributor	**mi.**
Auction House	**mi.**
Wholesale or Terminal Market	**mi.**
Food Processor	**mi.**

29. Of your direct to intermediate market sales, what percentage do you sell to

Distributor	**%**
Auction House	**%**
Wholesale or Terminal Market	**%**
Food Processor	**%**
Some other direct to intermediate market	**%**

30. Which auction(s) do you sell to? *(check all that apply)*

☐	**Portland Fish Exchange**
☐	**Cape Ann Seafood Exchange**
☐	**Whaling City Display Auction**
☐	**Some other auction**
☐	**None of the above – Skip to Question 32 on Page 15**

If you sold to some other auction, please use the space below to specify.

31. If you sell to an auction, why do you choose to sell to an auction house?

The following set of questions is about Future Markets

32. In the next two years, do you anticipate selling your catch to new markets?

☐	Yes
☐	No

33. In the next 2 years, do you anticipate selling your catch directly to any of the following? *(check all that apply)*

☐	**Consumers**
☐	**Retail markets**
☐	**Institutions**
☐	**Intermediate markets**

34. How important is it to you that you know the price you will receive for your catch before you go fishing?

Not important	Somewhat Important	Very Important
☐	☐	☐

35. How important is the price of catch in your decision of when to go fishing

Not important	Somewhat Important	Very Important
☐	☐	☐

36. Have your marketing and/or sales strategies changed since 2010?

☐	Yes	**Continue to Question 37**
☐	No	**Skip to Question 38**

37. If your marketing and/or sales strategies changed since 2010, please use the space below to tell us how.

38. Since the Northeast Multispecies Groundfish Sector program was established in 2010 and the fishery became a catch share, have you noticed any changes in the market?

☐	Yes	**Continue to Question 39**
☐	No	**Skip to Question 40 on Page 17**
☐	Not Applicable	**Skip to Question 40 on Page 17**

39. If you noticed any changes in the market, please use the space below to tell us how.

40. Since the catch share in the Atlantic Sea Scallop fishery was established in 2008, have you noticed any changes in the market?

☐	Yes	**Continue to Question 41**
☐	No	**Skip to Question 42**
☐	Not Applicable	**Skip to Question 42**

41. If you noticed any changes in the market, please use the space below to tell us how.

42. Did your business produce and sell any processed or value-added product?

☐	Yes
☐	No

43. Overall, what factors affect the way you market your fish?

44. Is there anything else you would like to share with us about your marketing efforts that we did not ask?

45. How long have you been involved in the groundfish and/or scallop fishery?

☐	Less than five years
☐	Between 5 and 10 years
☐	Between 10 and 20 years
☐	20 years or more

Thank you for taking the time to complete this survey.

Your participation helps us better understand how fisheries regulations impact permit holder businesses, communities and broader seafood supply chains. We are interested in sharing the results of our survey with you. If you would like a copy of the results, please provide your email address in the space below.

If after taking this survey you are interested in discussing your approaches to seafood marketing in your fishery, please email or call Joshua Stoll (joshua.stoll@maine.edu; 207-581-4307).

Please use the enclosed postage paid envelope to return the completed survey booklet by May 3, 2019

to:

Market Decisions Research

P.O. Box 1240

Portland, ME 04104

Appendix B. Interview Questions

1. To start, can you tell me about your involvement in fisheries ? (i.e. how did you get started, how long have you been involved, what fisheries)?
2. Where do you sell your catch? (Note: be attentive to the different market strategies. When they finish telling you, ask if there are any other strategies they use).
    a. Why do you choose this market avenue?
    b. Has who you sell to changed through time? When?
        i. What factors influenced these changes?
3. What are the biggest market-related challenges that you have experienced in operating your business?
4. Do you plan to make any changes to how/where you sell your catch?
5. Are there any state or federal level policies or regulations that have influenced how or who you can sell your catch to?
    a. Do these policies help to facilitate or provide opportunities for sales in any way?
6. Can you talk to me about how foreign imports play a role when it comes to the ability to sell your catch?
7. Do lease prices impact your ability to sell your catch to different markets?
    a. [If yes] How?
8. A number of fishermen around the country sell their catch at farmers markets, community support fisheries, or other types of direct-to-consumer avenues of sale. Can you discuss your experiences, if any, that you have had with this type of market?
9. It's also been noted that some fishermen sell directly to restaurants, or other types of retailers. Do you have any experiences with this type of market relationship?
10. What has your experience been with auction houses or wholesalers over the years?
11. One of the gaps identified in the survey was related to sales directly to institutions, for example schools and hospitals. This is a type of market that farmers utilize all over the country. In your opinion, what about sales to institutions makes it difficult for fishermen to pursue?
12. Are there strategies besides educating the public that would make a difference to your business?
13. What do you see as ways that could improve your ability to sell your catch to different markets?
14. Is there anything else you would like to comment on or share?
15. Do you have any final questions for me?

BIOGRAPHY OF THE AUTHOR

Amanda Fall was born in New Britain, Connecticut on March 4, 1994. She was raised in East Haddam, Connecticut and graduated from Nathan Hale Ray High School in 2012. She attended The University of Maine and graduated in 2017 with a Bachelor's degree in Marine Science with a concentration in Marine Biology and a minor in Fisheries Sciences. She returned to Maine a year later enrolled in the Marine Policy graduate program at The University of Maine. After receiving her degree, Amanda hopes to stay in Maine and begin her career in the policy or fisheries field. Amanda is a candidate for the Master of Science degree in Marine Policy from The University of Maine in May 2020.